

Serial No. 09/691,053

Docket No. Q60688

a selector adapted to select an optimal treatment protocol from said plurality of treatment protocols based on the modified system model.

2. (Amended) The system of claim 1 wherein the system model further comprises:  
a biological process model; and  
a treatment model that is adapted to model effects of a treatment on said biological process.

3. (Amended) The system of claim 2, wherein said biological process model comprises mathematical models for biological processes affecting healthy cell populations and biological processes affecting diseased cell populations with at least one disease.

5. (Twice amended) The system of claim 3 wherein said diseased cell populations is one of cancer cells, and diseased bone-marrow cells.

6. (Amended) The system of claim 2, wherein said treatment model comprises treatment specific processes that affect cell populations.

7. (Amended) The system of claim 6 wherein said treatment specific process comprises interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of

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affecting cell biology and causing cell death or cell replication.

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8. (Twice Amended) The system of claim 1 wherein, said parameters specific to the individual includes one selected from a group consisting of parameters related to biological process dynamics, patient specific drug pharmacokinetics, pharmacodynamics, and dynamics of dose-limiting host tissues.

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10. (Amended) The system of claim 1, wherein the selector is adapted to incorporate user-specific parameters in performing selection.

11. (Amended) The system of claim 10 wherein said selector is adapted to incorporate user-specific parameters by using a fitness function.

12. (Amended) The system of claim 11 wherein said fitness function adapted to incorporate at least one parameter selected from a group consisting of patient survival, time to death, time to reach a specified disease stage, tumor load, pathogen load, cytotoxicity, side effects, quality of life, cost of treatment, and pain.

13. (Amended) The system of claim 12, wherein the system is adapted to receive user input for specific coefficients for said at least one parameter and the system is further adapted to adjust the fitness function to satisfy the user's goals.

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17. (Amended) The system of claim 1 wherein said system is adapted to consider cytotoxic effects during selection of treatment protocols.

18. (Amended) The system of claim 1 wherein said system is adapted to consider drug efficacy during selection of treatment protocols.

19. (Amended) The system of claim 1, wherein the selector is adapted to use operation research methods for the selection.

20. (Amended) The system of claim 1, wherein the selector further comprises heuristics, said selector being adapted to use the heuristics for searching and selection.

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22. (Amended) The system of claim 1 wherein said recommendation comprises a combination of disease and treatment strategy, wherein said treatment strategy includes at least one of types of treatment, device, drug combination, treatment schedule and dosage.

23. (Amended) The system of claim 1, wherein, said system is adapted to be implemented over a distributed computing system.

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25. (Amended) The system of claim 23, wherein the system is adapted to be used remotely by a user.

26. (Amended) A computer system for recommending an optimal treatment protocol for a general patient, said system interfacing with the computer and said system further comprising:

- a system model;
- a treatment protocol generator adapted to generate a plurality of treatment protocols; and
- a selector to select an optimal treatment protocol from said plurality of treatment protocols based on the system model.

27. (Amended) The system of claim 26 wherein the system model further comprises:  
a biological process model; and  
a treatment model that is adapted to model the effects of a treatment on said biological process.

28. (Amended) The system of claim 27, wherein said biological process model comprises mathematical models for biological processes affecting healthy cell populations and biological processes affecting diseased cell populations with at least one disease.

30. (Amended) The system of claim 28 wherein said diseased cell populations is one of cancer cells, and diseased bone-marrow cells.

31. (Amended) The system of claim 27, wherein said treatment model comprises treatment specific processes that affect cell populations.

32. (Amended) The system of claim 31 wherein said treatment specific process comprises interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death or cell replication.
33. (Amended) The system of claim 26, wherein the selector is adapted to incorporate user-specific parameters in performing selection.
34. (Amended) The system of claim 33 wherein said selector is adapted to incorporate user-specific parameters by using a fitness function.
35. (Amended) The system of claim 34 wherein said fitness function is a function of at least one parameter selected from a group consisting of patient survival, time to death, time to reach a specified disease stage, tumor load, pathogen load, cytotoxicity, side effects, quality of life, cost of treatment and pain.
36. (Amended) The system of claim 35, wherein the system is adapted to receive user input for specific coefficients for said at least one parameter and the system is further adapted to adjust the fitness function to satisfy the user's goals.

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40. (Amended) The system of claim 26 wherein said system is adapted to consider cytotoxic effects during selection of treatment protocols.

41. (Amended) The system of claim 26 wherein said system is adapted to consider drug efficacy during selection of treatment protocols.

42. (Amended) The system of claim 26, wherein the selector is adapted to use operation research methods for the selection.

43. (Amended) The system of claim 26, wherein the selector further comprises heuristics, said selector being adapted to use the heuristics for searching and selection.

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45. (Amended) The system of claim 26 wherein said recommendation is a combination of disease and treatment strategy, wherein said treatment strategy includes at least one of types of treatment, device, drug combination, treatment schedule and dosage.

46. (Amended) The system of claim 26, wherein, said system is adapted to be implemented over a distributed computing system.

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48. (Amended) The system of claim 46, wherein the system is adapted to be used remotely by a user.



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50. (Amended) A computer system for predicting progression of a biological process in an individual patient under a plurality of treatment protocols, said computer system interfaces with a computer, wherein said biological process is related to healthy or diseased processes, one of said plurality of protocols being no treatment, said computer system comprising:

a system model;

a protocol generator for generating a plurality of treatment protocols; and

a system model modifier, wherein said system model modifier is adapted to modify said system model based on parameters specific to the individual.

a predictor to predict the progression of at least one of the disease and the natural biological process under said plurality of treatment protocols based on the modified system model.

51. (Amended) The system of claim 50 wherein the system model further comprises:  
a biological process model; and

a treatment model that models the effects of a treatment on said biological process.

52. (Amended) The system of claim 51, wherein said biological process model comprises mathematical models for biological processes affecting healthy cell populations and biological processes affecting diseased cell populations.

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54. (Amended) The system of claim 52 wherein said diseased cell populations is one of cancer cells, and diseased bone-marrow cells.

55. (Amended) The system of claim 51, wherein said treatment model comprises treatment specific processes that affect cell populations.

56. (Amended) The system of claim 55 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death.

57. (Amended) The system of claim 50 wherein, said parameters specific to the individual include one or more selected from a group consisting of parameters related to biological process dynamics, patient specific drug pharmacokinetics, pharmacodynamics, and dynamics of dose-limiting host tissues.

59. (Amended) A computer system for predicting progression of a biological process in a general patient under a plurality of treatment protocols, wherein said biological process is healthy or diseased processes, said plurality of protocols including no treatment, said system interfacing with the computer and said system further, said computer system comprising:

- a system model;
- a treatment protocol generator adapted to generate a plurality of treatment protocols; and
- a predictor to predict the progression of the disease or a natural biological process under said plurality of treatment protocols.



60. The system of claim 59 wherein the system model further comprises:  
a biological process model; and  
a treatment model that models the effects of a treatment on said biological process.

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61. (Amended) The system of claim 60, wherein said biological process model comprises mathematical models for biological processes affecting healthy cell populations and biological processes affecting diseased cell populations with at least one disease.

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63. (Amended) The system of claim 62 wherein said diseased cell populations is one of cancer cells, and diseased bone-marrow cells.

64. (Amended) The system of claim 60, wherein said treatment model comprises treatment specific processes that affect cell populations.

65. (Amended) The system of claim 64 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death or cell replication.

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234. (Amended) A computer system for recommending an optimal treatment protocol for treating cancer using drugs, for an individual, said system interfacing with the computer and

said system further comprising:

- a cancer system model;
- a treatment protocol generator for generating a plurality of treatment protocols for treating cancer using chemotherapy;
- a system model modifier, wherein said the system model modifier is adapted to modify said cancer system model based on parameters specific to the individual; and
- a selector adapted to select an optimal treatment protocol from said plurality of treatment protocols based on the modified system model.

235. (Amended) The system of claim 234 wherein the system model further comprises:

- a process model of cancer development; and
- a treatment model that is adapted to model the effects of treating cancer with drugs, including chemotherapy.

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237. (Amended) The system of claim 235 where a tumor cell cycle is divided into at least four compartments G1, S, G2 and M and a quiescent stage is denoted by G0, wherein each of said four compartments is further subdivided into sub-compartments and an  $i^{\text{th}}$  sub-compartment representing cells of age I in the corresponding compartment, wherein the system is adapted to ensure that cells entering a compartment always enter a first sub-compartment of the compartment.

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238. (Amended) The system of claim 237 wherein the model is adapted to trace development of cancer cells using a predetermined set of parameters by calculating a number of cells in each subcompartment using stepwise equations.

239. (Amended) The system of claim 238 wherein the system is adapted to use a probability vector is used to determine a fraction of cells that leaves any subcompartment in a compartment to move to a first subcompartment of the next compartment.

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C2 } 240. (Amended) The system of claim 238 where the system includes a set control functions that are adapted to uniquely determine an outcome of every single step, wherein said control functions comprise age of cells, state of a current population and associated environment.

241. (Amended) The system of claim 238 wherein the system comprises a model representing a tumor the model comprising a combination of a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

B18 242. (Amended) The system of claim 241, wherein the system is adapted to calculate in each step, a number of cells in each sub-compartment of each compartment of each group according to factors including a previous state, parameters of tumor, tumor current microenvironment and drug concentration.

B19 Sub C3 } 244. (Amended) The system of claim 243, wherein the system is adapted to incorporate pharmacokinetic and pharmacodynamic, cytostatic effects, cytotoxic effects, and other effects on cell disintegration of anticancer drugs.

245. (Amended) The system of claim 244 wherein the system is adapted to incorporate a dose-limiting toxicity into the model.

B20 Sub A } 246. (Twice Amended) The system of claim 234 wherein, said parameters specific to the individual comprise parameters related to tumor dynamics, patient specific drug pharmacokinetic, pharmacodynamic and dynamics of dose-limiting host tissues.

B21 248. (Amended) A computer system for predicting a progression of cancer in individual patients, said system interfacing with the computer and said system further comprising:

- a cancer system model;
- a treatment protocol generator to generate a plurality of treatment protocols for treating cancer using drugs;
- a system model modifier, wherein system model modifier is adapted to modify said system model based on parameters specific to the individual; and
- a predictor to predict the progression of cancer under the plurality of treatment protocols based on the modified system model.

249. (Amended) The system of claim 248 wherein the system model further comprises:

a process model of cancer development; and

a treatment model that is adapted to model the effects of treating cancer with drugs.

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251. (Amended) The system of claim 249 where a tumor cell cycle is divided into at least four compartments G1, S, G2 and M and a quiescent stage is denoted by G0, wherein each of said four compartments is further subdivided into sub-compartments and an  $i^{\text{th}}$  sub-compartment representing cells of age in the corresponding compartment, wherein the system is adapted to ensure that cells entering a compartment always enter a first sub-compartment of the compartment.

252. (Amended) The system of claim 251 wherein the model is adapted to trace development of cancer cells using a predetermined set of parameters by calculating a number of cells in each subcompartment using stepwise equations.

253. (Amended) The system of claim 252 wherein the system is adapted to use a probability vector is used to determine a fraction of cells that leaves any subcompartment in a compartment to move to a first subcompartment of the next compartment.

254. (Amended) The system of claim 252 where the system includes a set control functions that are adapted to uniquely determine an outcome of every single step, wherein said control functions comprise age of cells, state of a current population and associated environment.

255. (Amended) The system of claim 252 wherein the system comprises a model representing a tumor the model comprising a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

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256. (Amended) The system of claim 255, wherein the system is adapted to calculate in each step, a number of cells in each sub-compartment of each compartment of each group according to factors including a previous state, parameters of tumor, tumor current microenvironment and drug concentration.

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258. (Amended) The system of claim 257, wherein the system is adapted to incorporate pharmacokinetic and pharmacodynamic, cytotoxic effects and cytostatic effects of anticancer drugs.

259. (Amended) The system of claim 258 wherein the system is adapted to incorporate a dose-limiting toxicity into the model.

260. (Amended) The system of claim 248 wherein, said parameters specific to the individual comprise parameters related to tumor dynamics, patient specific drug pharmacokinetic [PK], pharmacodynamic, and dynamics of dose-limiting host tissues.

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262. (Amended) A computer system for predicting the a progression of cancer in a general patients, said system interfacing with the computer and said system further comprising:  
a cancer system model;  
a treatment protocol generator to generate a plurality of treatment protocols for treating cancer using drugs; and  
a predictor to predict the progression of cancer under the plurality of treatment protocols based on the modified system model.

263. (Amended) The system of claim 262 wherein the system model further comprises:  
a process model of cancer development; and  
a treatment model that is adapted to model the effects of treating cancer with drugs, including chemotherapy.

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265. (Amended) The system of claim 263 where a tumor cell cycle is divided into at least four compartments G1, S, G2 and M and a quiescent stage is denoted by G0, wherein each of said four compartments is further subdivided into sub-compartments and an ith sub-compartment representing cells of age I in the corresponding compartment, wherein the system is adapted to ensure that cells entering a compartment always enter a first sub-compartment of the compartment.

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266. (Amended) The system of claim 265 wherein the model is adapted to trace development of cancer cells using a predetermined set of parameters by calculating a number of

cells in each subcompartment using stepwise equations.

267. (Amended) The system of claim 266 wherein the system is adapted to use a probability vector is used to determine a fraction of cells that leaves any subcompartment in a compartment to move to a first subcompartment of the next compartment.

268. (Amended) The system of claim 266 where the system includes a set control functions that are adapted to uniquely determine an outcome of every single step, wherein said control functions comprise age of cells, state of a current population and associated environment.

269. (Amended) The system of claim 266 wherein the system comprises a model representing a tumor the model comprising a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

270. (Amended) The system of claim 269, wherein the system is adapted to calculate in each step, a number of cells in each sub-compartment of each compartment of each group according to factors including a previous state, parameters of tumor, tumor current microenvironment and drug concentration.

B26 sub C6 } 272. (Amended) The system of claim 271, wherein the system is adapted to incorporate pharmacokinetic and pharmacodynamic, cytotoxic effects and cytostatic effects of

anticancer ~~drugs.~~

273. (Amended) The system of claim 272 wherein the system is adapted to incorporate a dose-limiting toxicity into the model.

274. (Amended) A computer-implemented method of recommending an optimal treatment protocol for an individual comprising:

- creating a system model;
- enumerating a plurality of treatment protocols;
- modifying the system model based on parameters specific to the individual;
- selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model and
- recommending said optimal treatment.

275. (Amended) The method of claim 274 wherein the step of creating the system model further comprises:

- modelling a biological process; and
- modelling effects of a treatment on said biological process.

325<sup>sub B</sup> c9 } 276. (Amended) The method of claim 275, wherein said modelling of biological processes is done by mathematically modelling biological processes affecting healthy cell populations and mathematically modelling biological processes affecting diseased cell

populations with at least one disease.

277. (Amended) The method of claim 276 wherein said healthy cell populations include bone-marrow cells and host tissue cells that are affected by said treatment model.

Sub 278. (Amended) The method of claim 276 wherein said diseased cell populations is one of cancer cells, and diseased bone-marrow cells.

279. (Amended) The method of claim 275, wherein said treatment models comprise treatment specific processes that affect cell populations.

280. (Amended) The method of claim 279 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death or cell replication.

B26 281. (Amended) The method of claim 274 wherein, said parameters specific to the individual include one or more selected from a group consisting of parameters related to biological process dynamics, patient specific drug pharmacokinetics, pharmacodynamics and dynamics of dose-limiting host tissues.

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285. (Amended) The method of claim 284 wherein said fitness function incorporates at least one parameter selected from a group consisting patient survival, time to death, time to reach a specified disease stage, tumor load, pathogen load, cytotoxicity, side effects, quality of life, cost of treatment and pain.

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290. (Amended) The method of claim 274 wherein said system is adapted to consider cytotoxic effects during selection of treatment protocols.

291. (Amended) The method of claim 274 wherein said system is adapted to consider drug efficacy during selection of treatment protocols.

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295. (Amended) The method of claim 274 wherein said recommendation is a combination of disease and treatment strategy, wherein said treatment strategy includes at least one of types of treatment, device, drug combination, treatment schedule and dosage.

296. A computer-implemented method of recommending an optimal treatment protocol for a general patient comprising:  
creating a system model;  
enumerating a plurality of treatment protocols;  
selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model; and  
recommending said optimal treatment.

297. (Amended) The method of claim 296 wherein the step of creating the system model further comprises:

modelling a biological process; and

modelling effects of a treatment on said biological process.

829 298. (Amended) The method of claim 297, wherein said modelling of biological processes is done by mathematically modelling biological processes affecting healthy cell populations and mathematically modelling biological processes affecting diseased cell populations with at least one disease.

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B30 299. (Amended) The method of claim 298 wherein said healthy cell populations include bone-marrow cells and host tissue cells that are affected by said treatment model.

300. (Amended) The method of claim 298 wherein said diseased cell populations with at least one disease is one of cancer cells, and diseased bone-marrow cells.

301. (Amended) The method of claim 297, wherein said treatment models comprise treatment specific processes that affect cell populations.

302. (Amended) The method of claim 301 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes,



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cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death.

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305. (Amended) The method of claim 304 wherein said fitness function incorporates at least one parameter selected from a group consisting of patient survival, time to death, time to reach a specified disease stage, tumor load, pathogen load, cytotoxicity, side effects, quality of life, cost of treatment and pain.

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310. (Amended) The method of claim 296 wherein said system is adapted to consider cytotoxic effects during selection of treatment protocols.

311. (Amended) The method of claim 296 wherein said system is adapted to consider drug efficacy during selection of treatment protocols.

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315. (Amended) The method of claim 296 wherein said recommendation is a combination of disease and treatment strategy, wherein said treatment strategy includes at least one of types of treatment, device, drug combination, treatment schedule and dosage.

316. (Amended) A computer-implemented method of predicting progression of a biological process in an individual patient under a plurality of treatment protocols, wherein said biological process could be related to healthy or diseased processes, said plurality of protocols including no treatment, said method comprising:

creating a system model;  
enumerating a plurality of treatment protocols; and  
modifying the system model based on parameters specific to the individual.  
selecting an optimal treatment protocol from said plurality of treatment protocols based  
on the modified system model; and  
predicting said progression based on the modified system model and selected optimal  
treatment protocol.

317. (Amended) The method of claim 316 wherein the step of creating a system model  
further comprises:

modelling a biological process; and  
modelling the effects of the treatment on said biological process.

318. (Amended) The method of claim 317, wherein said step of modelling a biological  
process comprises creating a mathematical model for biological processes affecting healthy cell  
populations and creating a biological processes affecting diseased cell populations with at least  
one disease.

320. (Amended) The method of claim 318 wherein said diseased cell populations with  
at least one disease is one of cancer cells, and diseased bone-marrow cells.

321. (Amended) The method of claim 317, wherein said treatment models comprise treatment specific processes that affect cell populations.

322. (Amended) The method of claim 321 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death or cell replication.

B34 323. (Amended) The method of claim 316 wherein, said parameters specific to the individual include one or more selected from a group consisting of parameters related to biological process dynamics, patient specific drug pharmacokinetics, pharmacodynamics, and dynamics of dose-limiting host tissues.

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B35 325. (Amended) A computer-implemented method of predicting progression of a biological process in a general patient under a plurality of treatment protocols, wherein said biological process could be related to healthy or diseased cells, said plurality of protocols including no treatment, said method comprising:

- creating a system model;
- enumerating a plurality of treatment protocols;
- selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model; and

predicting said progression based on the modified system model and selected optimal treatment protocol.

326. (Amended) The method of claim 325 wherein the step of creating a system model further comprises:

B35 modelling a biological process; and

modelling the effects of the treatment on said biological process.

B36 329. (Amended) The method of claim 327 wherein said cell populations with at least one disease is one of cancer cells, and bone-marrow cells.

B37 331. (Amended) The method of claim 330 wherein said treatment specific process is interactions and associated biological processes involving one of a group consisting of pharmacokinetic interactions and processes, pharmacodynamic interactions and processes, cytostatic interactions and processes, cytotoxic interactions and processes, and methods of affecting cell biology and causing cell death or cell replication.

B38 466. (Amended) A computer-implemented method for recommending an optimal treatment protocol for treating cancer using drugs , including chemotherapy, for an individual, said method comprising:

creating a cancer system model;

enumerating a plurality of treatment protocols for treating cancer using drugs;

modifying the system model based on parameters specific to the individual;  
selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model; and  
recommending said optimal treatment.

467. (Amended) The method of claim 466 wherein the system model further comprises:

a process model of cancer development; and

a treatment model that models the effects of treating cancer with drugs, including chemotherapy.

472. (Amended) The method of claim 470 where a set control functions uniquely determine an outcome of every single step, wherein said control functions comprise age of cells, state of a current population and associated environment.

473. (Amended) The method of claim 470 wherein a tumor is modelled as a combination of a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

476. (Amended) The method of claim 475, wherein pharmacokinetic and pharmacodynamic, cytotoxic effects, cytostatic effects and other effects on cell disintegration of anticancer drugs are incorporated into the model.

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478. (Amended) The method of claim 466 wherein, said parameters specific to the individual comprise parameters related to tumor dynamics, patient specific drug pharmacokinetic, pharmacodynamic, and dynamics of dose-limiting host tissues.

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480. (Amended) A computer-implemented method of predicting a progression of cancer in an individual, said method comprising:  
  
creating a cancer system model;  
  
enumerating a plurality of treatment protocols for treating cancer using drugs, including chemotherapy;  
  
modifying the system model based on parameters specific to the individual;  
  
selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model; and  
  
predicting said progression based on the modified system model and selected optimal treatment protocol.

481. (Amended) The method of claim 480 wherein the system model further comprises:  
  
a process model of cancer development; and  
  
a treatment model that models the effects of treating cancer with drugs.

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486. (Amended) The method of claim 484 where a set control functions uniquely determine an outcome of every single step, wherein said control functions comprise age of cells,



state of a current population and associated environment.

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487. (Amended) The method of claim 484 wherein a tumor is modelled as a combination of a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

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490. (Amended) The method of claim 489, wherein pharmacokinetic and pharmacodynamic, cytotoxic and other cell disintegration effects, and cytostatic effects of anticancer drugs are incorporated into the model.

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492. (Amended) The method of claim 480 wherein, said parameters specific to the individual comprise parameters related to tumor dynamics, patient specific drug pharmacokinetic, pharmacodynamic, and dynamics of dose-limiting host tissues.

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494. (Amended) A computer-implemented method of predicting a progression of cancer in a general patient, said method comprising:

- creating a cancer system model;
- enumerating a plurality of treatment protocols for treating cancer using drugs;
- selecting an optimal treatment protocol from said plurality of treatment protocols based on the modified system model; and
- predicting said progression based on the modified system model and selected optimal treatment protocol.

495. (Amended) The method of claim 494 wherein the system model further comprises:

a process model of cancer development; and

B4b a treatment model that models the effects of treating cancer with drugs, including chemotherapy.

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B47 500. (Amended) The method of claim 498 where a set control functions uniquely determine an outcome of every single step, wherein said control functions comprise age of cells, state of a current population and associated environment.

501. (Amended) The method of claim 498 wherein a tumor is modelled as a combination of a plurality of groups of cells, each of said groups of cells representing a similarly behaving group of cells distributed between all the cell-cycle compartments.

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B4b 504. (Amended) The method of claim 503, wherein pharmacokinetic and pharmacodynamic, cytotoxic effects and cytostatic effects of anticancer drugs are incorporated into the model.

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B49 506. (Amended) A computer program product, including a computer readable medium, said program product comprising a set of instruction to enable a computer system to aid in recommending an optimal treatment protocol for an individual comprising:

a system model code;

treatment protocol generator code for generating a plurality of treatment protocols;  
a system model modifier code, wherein said system model code is adapted to modify the system model based on parameters specific to the individual to generate a modified system model code; and  
a selector code to select an optimal treatment protocol from said plurality of treatment protocols based on the modified system model.

507. (Amended) The computer program product of claim 506 wherein the system model code further comprises:

a biological process model code; and  
a treatment model code that enables a computer to model the effects of a treatment on the biological process.

508. (Amended) A computer program product, including a computer readable medium, said program product comprising a set of instructions to enable a computer system to aid in recommending an optimal treatment protocol for a general patient comprising:

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a system model code;  
treatment protocol generator code for a generating a plurality of treatment protocols; and  
a selector code to select an optimal treatment protocol from said plurality of treatment protocols.

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509. (Amended) The computer program product of claim 508 wherein the system model code further comprises:

a biological process model code; and

B49 a treatment model code that enables a computer to model the effects of a treatment on the biological process.

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